SMHI

Oceanographic Unit
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AlgAware

ALGAL SITUATION IN MARINE WATERS SURROUNDING SWEDEN

Sampling route of the expedtion in July 2021

Sammanfattning

Analyserna utfördes ombord på fartyget Svea under expeditionens gång. Vatten från integrerat djup alternativt diskreta djup har filtrerats ner på 5µm filter och analyserats med ett rättvänt mikroskop. Metoden innebär att framförallt större celler kan identifieras medan små celler blir svårbestämda och förbises i större utsträckning

Västerhavet

Vid alla stationer i Västerhavet var artdiversiteten och totala cellantalen relativt låga. Vid samtliga stationer förekom kiselalgen *Proboscia alata* i högst cellantal. Bland Ddinoflagellater var släktet *Tripos* vanligast. Framförallt i de fluoroscenstoppar som återfanns var flera olika arter av släktet *Tripos* dominerande. Flera fluorescenstoppar återfanns i Å-snittet och vid Å17 dominerade *Tripos macroceros* på 30 m.

Östersjön

Redan i Öresund, på ingång till egentliga Östersjön, noterades små sporadiska ytansamlingar. I sydvästra delen av östersjön återfanns riskornsstora aggregeringar i ytvattnet. Väster om Bornholm började betydligt större och större ytansamlingar synas och norr om Bornholm var de utbredda i stora sjok. Samtliga analyser visade att den potentiellt skadliga arten *Nodularia spumigena** klart dominerade. På väg ut mot sydöstra delen av Östersjön återfanns smalare strimmor av ytansamlingar. I den östra delen av Östersjön, utefter Gotlands östkust, återfanns sporadiska ytansamlingar långt bort från båten. Vinden tog tillfälligt i vilket omblandade vattnet vid Gotlandsjupet. *N. spumigena** dominerade i samtliga prover längs Gotlands Östkust men i mindre antal. Norr om Gotland återfanns inga ytansamlingar trots lugnt vatten. Ytproverna innehöll alla tre grupper av filamentösa cyanobakterier i mindre antal så potential finns för blomningar framöver. På väg söderut mellan Gotland och Öland noterades mer sporadiska strimmor och korn. Kring södra Öland, i Kalmarsund samt Hanöbukten så var vinden tillräckligt stark för att blanda vattnet. Tydliga riskorns stora aggregeringar syntes dock i olika mängd i övre vattenpelaren. Ytprover från detta område visade att alla tre grupper återfanns i dessa vatten.

För att se satellittolkningar av ytansamlingar av cyanobakterier:

https://www.smhi.se/vadret/hav-och-kust/algsituationen

algsituationen

Abstract

The analyses were made on bord the ship Svea during the cruise. Water from integrated sampels or discrete depths were filtrated down to filters with 5µm pore size. The method is most suitebale for identifying larger and more robust cells whereas smaller cells and fragile cells are difficult to determine taxonomically are missed to a higher degree.

West coast

All stations along the west coast had low to moderate cell numbers and biodiversity. At most stations diatoms dominated where *Proboscia alata* was most abundant. The dinoflagellates were mainly represented by different species belonging to the genus *Tripos*. This genus was especially common in the fluorescense peaks found at several stations along the Å-transect and at Å17 *Tripos macroceros* dominated.

Baltic Sea

Small sporadic aggregations were already seen in the Sound. In the southwestern parts of the Baltic proper grains were noted in the upper water column. West of Bornholm larger areas with surface accumulations appeared and increased in size and coverage going north of Bornholm. All samples from these areas were clearly dominated by the potentially toxic filamentous cyanobacteria *Nodularia spumigena**. Going onward towards the southeastern part of the Baltic the accumulations decreased to thin streaks. The eastern part of the Baltic proper, alongside Gotland, the surface accumulations were sporadic and far away from the boat. Still *N. spumigena** dominated among the filamentous cyanobacteria but less filaments were found. North of Gotland the water was calm but no aggregations were seen. The samples contained all three major groups of filamentous cyanobacteria so a potential surface bloom in the near future is possible. Between Gotland and Öland small sporadic streaks and grains were noted. The windstress were mixing the waters around the south of Öland, Kalmar sound and at Hanö bight. Even so grains were noted in the upper water column in different amounts in this area. Surface samples revealed that all three groups were present in these water.

Please follow the link below to see interpretations of blooms from satellite images in the Baltic:

https://www.smhi.se/vadret/hav-och-kust/algsituationen

Below follows a more detailed information on species composition and abundance. Species marked with * are potentially toxic or harmful.

The Skagerrak

Släggö (Skagerrak coast) 13th of July

Both the species diversity and total cell numbers were moderate. Diatoms dominated in numbers and *Proboscia alata* were found in highest numbers. The dinoflagellates were mainly represented by the genus *Tripos* and *Prorocentrum micans.* Among the smaller cells the coccolithophore *Emilinia huxleyi* was found in highest cell numbers.

Å17 (open Skagerrak) 13h of July

Both the species diversity and total cell numbers were low. The dinoflagellate genus *Tripos* was most common together with the diatom *Proboscia alata. Emiliania huxleyi* dominated among the smaller cells. A thin fluorescence peak was found at about 30 meters which mainly contained different species of the genus *Tripos,* especially *T. macroceros* was common.

Several fluorescense peaks were also found at the other Å-transekt stations at about 20-30 m with a clear dominance of the genus *Tripos* but the diatoms *Leptocylindrus danicus* and *Proboscia alata* were also found in high cell numbers.

The diatom *Proboscia alata* was the most commonly found species at all stations along the Swedish West coast.

The Kattegat

Anholt E 14th and 18h of July

The species diversity was low but cell numbers relatively high on the both occasions. The integrated samples taken by hose (0-10 m) were similar on both sampling occasions and clearly dominated by the diatom *Proboscia alata.* The dinoflagellate genus *Tripos* was also noted in moderate cell numbers on the first sampling but less on the second sampling occasion. A few cells of the filamentous cyanobacteria *Nodularia spumigena** was found on both occasions. A small fluorescence maximum was detected at 20 m on the first occasion and on 25 m on the second occasion on both times consisting mainly of different species belonging to the genus *Tripos.*

N14 Falkenberg 14th of July

The species diversity was low but cell numbers was high. The integrated sample taken by hose (0-10 m) was clearly dominated by the diatom *Proboscia alata.* The dinoflagellate genus *Tripos* was also noted in moderate cell numbers. A few cells of the filamentous cyanobacteria *Nodularia spumigena** was found. A small fluorescence maximum was detected at 10 m containing the same community as the integrated sample.

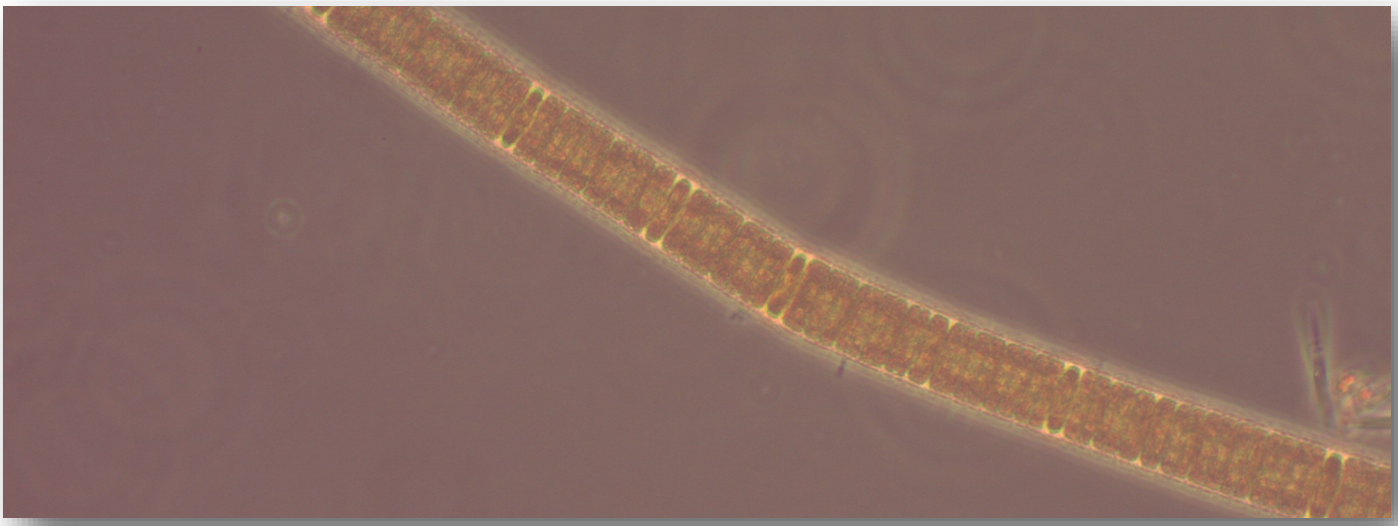
The Baltic Sea

BY2 Arkona Basin 15th of July
Many small grains of cyanobacteria were visible in the upper water column but no surface accumulations. The surface sample was dominated by *Nodularia spumigena**. The integrated sample contained quite a few filamentous cyanobacteria with almost equal amounts of *Nodularia spumigena** *and Aphanizomenon flosaquae.* Besides the cyanobacteria, high cell numbers of the diatoms *Proboscia alata** and *Cylindrotheca closterium* were present.

BY4 Christiansö 15th of July
This was the first station with surface accumulations in forms of streaks but also patches. The potentially harmful filamentous cyanobacteria *Nodularia spumigena** clearly dominated the surface sample.

BY5 Bornholm Basin 15th of July
Large areas of surface aggregations were found in form of large streaks or large patches. Among the filamentous cyanobacteria *Nodularia spumigena** dominated The integrated sample (0-10 m) consisted of only a few species besides the cyanobacteria, where the diatom *Cylindrotheca closterium* was most common.

BCS III-10 16th of July
The station was sampled at night so surface accumulations could not be verified. The collected surface sample contained moderate amounts of filaments of *Nodularia spumigena* * indicating that no large surface accumulations were present. The hose sample (0-10 m) mainly contained many different colony forming pico-cyanobacteria besides filamentous cyanobacteria.



The potentially harmful filamentous cyanobacteria *Nodularia spumigena** dominated clearly in the surface waters of south western parts of the Baltic proper where the surface accumulations were substantial. It was also a major part of the plankton community at the other station.

BY10 16th of July
Small grains were clearly visible from the boat but the low wind stress forced the aggregations to disperse in the first few meters. The concentration of filaments in the collected surface water were relatively high and dominated by *Nodularia spumigena* *. A mixed sample (0-10 m) from different depths contained very few species besides filamentous cyanobacteria.

BY15 16th of July
The wind had increased and the waves did not allow any surface accumulations. No aggregations were visible at all. A few filaments of *Nodularia spumigena* * were noted in the surface sample. The integrated sample (0-10m) contained several cells of the dinoflagellate *Dinophysis norvegica** and also many filaments of *N. spumigena* * and the genus *Planktolynghya.*

BY32 Norrköping deep 17th of July
The sea was calm but no surface accumulations were seen. The surface sample contained all three groups of filamentous cyanobacteria where *Aphanizomenon flosaquae* was most common, *Nodularia spumigena** less abundant and the genus *Dolichospermum* even lesser abundant. The integrated sample indicated that the filaments most likely were dispersed into the water column. In the integrated sample *Heterocapsa triquetra* and *Dinophysis norvegica** were most common along with the filamentous cyanobacteria.

BY38 Karlsö deep 17th of July
No surface accumulations were seen. The surface sample contained equal amounts of filaments of both *Aphanizomenon flosaquae* and *Nodularia spumigena**. The integrated sample contained, besides filamentous cyanobacteria, the dinoflagellates *Heterocapsa triquetra, Dinophysis norvegica* and a lot of colony forming picocyanobacteria of different sorts.

Ref M1V1 18th of July
The station was sampled during night with windstress and thereby waves. Both a surface sample and an integrated sample were collected. Quite a few filaments of all three groups of filamentous cyanobacteria were noted in the surface sample. The integrated sample (0-10m) contaied, besided filamentous cyanobacteria, mainly smaller cells. Among the smaller cells the diatoms *Chaetoceros throndsenii and Cyclotella choctawhatcheeana* were common. Different colonyforming cyanobacteria were also common.

Hanö Bight 18th of July
The winsdstress was keeping the water column mixed but a lot aggregates in forms of grains could be seen. The surface sample contained equal amounts amounts of *Aphanizomenon flosaquae* and *Nodularia spumigena**.

Surface samples, bucket	The following filamentous cyanobacteria were observed:		
Station:	***Aphanizomenon flosaquae***	***Nodularia spumigena****	***Dolichospermum spp.***
BY2 15/7	present	common	present
BY4 15/7		very common	
BY5 15/7	present	very common	present
BCSIII-10 16/7	present	common	
BY10 16/7		common	
BY15 16/7		common	
BY20 16/7	present	present	present
BY32 17/7	present	present	
BY38 17/7	common	common	
BY39 Ölands södra 17/7	common	common	present
Ref M1W1 18/7	common	common	common
Hanöbukten 18/7	common	common	present

Phytoplankton analysis, text and photos:
Marie Johansen

Selection of observed species	**Anholt E**	**Anholt E**	**N14 Falkenberg**	**Släggö**	**Å17**
Red=potentially toxic species	**14/7**	**19/7**	**14/7**	**13/7**	**13/7**
Hose 0-10 m	**presence**	**presence**	**presence**	**presence**	**presence**
Cerataulina pelagica				present	
Cylindrotheca closterium	present	common	present	present	common
Dactyliosolen fragilissimus			present		present
Leptocylindrus danicus				common	present
Nitzschia longissima		present	present		
Proboscia alata	very common	very common	dominating	very common	very common
Pseudo-nitzschia				present	
Skeletonema marinoi				common	
cf. Azadinium				present	
Dinophysis acuminata				present	
Gymnodiniales	present			present	present
Heterocapsa rotundata	present	present	present	present	
Prorocentrum micans				common	
Protoperidinium crassipes				present	
Tripos fusus	present	present	present	present	common
Tripos lineatus				present	
Tripos macroceros					present
Tripos muelleri	common	present	present	present	present
Emiliania huxleyi		present	present	common	present
Cryptomonadales			present	present	
Octactis speculum				common	
Dolichospermum	present	present			
Nodularia spumigena	present	present	present		

Selection of observed species	BY2	BY5	BY10	BCSIII-10	BY15	BY32	BY38	Ref M1V1
Red=potentially toxic species	15/7	15/7	16/7	16/7	16/7	17/7	17/7	18/7
Hose 0-10 m	presence	presence	presence	presence	presence	presence	presence	presence
Actinocyclus	present	present						
Chaetoceros danicus	present	present						present
Chaetoceros similis						present		
Chaetoceros subtilis						present		
Chaetoceros throndsenii								common
Cyclotella choctawhatcheeana						present		common
Cylindrotheca closterium	common	common						present
Pennales	present	present						
Proboscia alata	common							
Skeletonema marinoi	present	present						
Dinophysis acuminata					present	present	present	
Dinophysis norvegica			present		common	common	common	
Gymnodiniales					present	present	present	common
Heterocapsa triquetra						common	common	
Peridiniales		present						
Phalacroma rotundatum						present		
Prorocentrum cordatum	present							
Dinobryon						present		
Dinobryon faculiferum						present		
Prymnesiales							present	
Oocystis							present	
Binuclearia lauterbornii				present			present	
Cryptomonadales	present	common	present				present	
Aphanizomenon flosaquae	common				present	common	common	common
Dolichospermum		present				present	present	common
Nodularia spumigena	common	common	common	common	common	present	common	common
Aphanocapsa	present	present	present	present	present	present	present	present
Aphanothece	present	present	present	common	present	present	present	present
Aphanothece paralleliformis				common	present	common	common	present
Cyanonephron				present				
cf. Planktolyngbya			common		common			
Planktolyngbya						common	common	common
Snowella				present	present	present	present	
Ebria tripartita	present	present						

Om AlgAware

SMHI genomför månatliga expeditioner i Östersjön och Västerhavet. Resultat baserade på semikvantitativ mikroskopanalys av planktonprover samt klorofyllmätningar presenteras kortfattat i denna rapport. Information från SMHI:s satellitövervakning av algblomningar finns under perioden juni-augusti på www.smhi.se. Resultat från provtagningarna kan hämtas från SMHI:s databas på www.sharkweb.smhi.se. Hydrografidata läggs ut varje månad, växtplanktondata läggs ut en gång per år.

About AlgAware

SMHI carries out monthly cruises in the Baltic and the Kattegat/Skagerrak. Results from semi quantitative microscopic analysis of phytoplankton samples as well as chlorophyll measurements are presented in brief in this report. Information from SMHI´s satellite monitoring of algal blooms is found on www.smhi.se during the period June-August. Results from the expeditions are found in the SMHI database, www.sharkweb.smhi.se. Data are published monthly, phytoplankton data however, are published once a year.

Art / Species	Gift / Toxin	Eventuella symptom	Clinical symptoms
Alexandrium spp.	Paralytic shellfish poisoning (PSP)	**Milda symptom:** Inom 30 min.: Stickningar eller en känsla av bedövning runt läpparna, som sprids gradvis till ansiktet och nacken; stickningar i fingertoppar och tår; Huvudvärk; yrsel, illamående, kräkningar, diarré **Extrema symptom:** Muskelförlamning; andningssvårigheter; känsla av att kvävas; Man kan vara död inom 2-24 timmar efter att ha fått i sig giftet, på grund av att andningsmuskulaturen förlamas.	**Mild case:** Within 30 min: tingling sensation or numbness around lips, gradually spreading to face and neck; prickly sensation in fingertips and toes; headake, dizziness, nausea, vomiting, diarrhoea. **Extreme case** Muscular paralysis; pronounced respiratory difficulty; choking sensation; death trough respiratory paralysis may occur within 2-24 hours after ingestion.
Dinophysis spp.	Diarrehetic shellfish poisoning (DSP)	**Milda symptom:** Efter cirka 30 minuter till några timmar: yrsel, illamående, kräkningar, diarré, magont **Extrema symptom:** Upprepad exponering kan orsaka cancer	**Mild case:** Within 30 min-a few hours: dizziness, nausea, vomiting, diarrhoea, abdominal pain. **Extreme case:** Repeated exposure may cause cancer.
Pseudo- nitzschia spp.	Amnesic shellfish poisoning (ASP)	**Milda symptom:** Efter 3-5 timmar: yrsel, illamående, kräkningar, diarré, magkramper **Extrema symptom:** Yrsel, hallucinationationer, förvirring, förlust av korttidsminnet, kramper	**Mild case:** Within 3-5 hours: dizziness, nausea, vomiting, diarrhoea, abdominal cramps. **Extreme case:** dizziness, hallucinations, confusion, loss of memory, cramps.
Chaetoceros concavicornis/ C.convolutus	Mechanical damage through hooks on setae	**Låg celltäthet:** Ingen påverkan. **Hög celltäthet:** Fiskens gälar skadas, fisken dör.	**Low cell numbers:** No effect on fish. **High cell numbers:** Fish death due to gill damage.
Pseudochattonella spp.	Fish toxin	**Låg celltäthet:** Ingen påverkan. **Hög celltäthet:** Fiskens gälar skadas, fisken dör.	**Low cell numbers:** No effect on fish. **High cell numbers:** Fish death due to gill damage.

Översikt över några potentiellt skadliga alger och det aktuella giftets effekt. Overview of potentially harmful algae and effects of toxins. Manual on harmful marine microalgae (2003 - UNESCO Publishing).

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www.smhi.se

Havs och Vatten myndigheten